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Burrat Samurai armor door sweep
Norway rats test result

試験成績報告書

「ラットシールド 毛丈 12 mm PP 0.15 黒直」の
ドブネズミに対する侵入阻止効力試験

依頼者：株式会社バーテック

平成 28 年 11 月 21 日

一般財団法人 日本環境衛生センター

東日本支局 環境生物・住環境部 環境生物課

担当者 数間



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1. Samples: The following samples provided by the client

Test sample; Burrat Samurai Armor, bristle height 12 mm (PP, 0.15, black, straight), stainless steel, Lot no.: none

Control sample; Door Door Mushiheru, bristle height 12 mm, resin, lot no.: none

2. Test animals: 3 Norway rats (*Rattus norvegicus*)

Cycle I; Male, weight 339 g → 280 g post test (22 days)

Cycle II; Female, weight 186 g → 173 g post test (21 days)

Cycle III; Male, weight 226 g → 150 g post test (22 days)

3. Test period: Cycle I; August 29 - September 20, 2016

Cycle II; September 20 - October 11, 2016

Cycle III; October 11 - November 2, 2016

4. Test location:
Biological laboratory, 3rd floor, Japan Environmental Sanitation Center

5. Test method:

1) Two metal boxes (floor surface 40 x 40 cm, height 40 cm) were connected by a passage (100 cm).

A cage was arranged in one as a nest site and food and water were arranged in the other as a feed station (Fig. 1). An aluminum plate was attached at a height of 30 mm from the floor of the entrance to the feed station (Fig. 2, 3).

2) Test animals were released individually into this apparatus. The animal acclimatized to the environment over a period 6 to 8 days and was confirmed to eat food at the feed station.

3) Next, the control sample was attached to the entrance to the feed station (Fig. 4). The animal was confirmed to pass through the installed sample and enter into the feed station. The evaluation was made by photographing the degree of gnawing on the control sample at 5-7 days (in principle, until entry into the feed station was confirmed) and the state of feed consumption. 30 g of powder feed (MF, Oriental Yeast Co., Ltd.) was provided per day. To mitigate the hunger and dehydration of the test animals, water alone was placed close to the nest site on Wednesday, and 3 days' worth of feed and water on Friday for the Saturday and Sunday*.

4) When entry to the feed station was confirmed, the control sample was exchanged for the test sample, and it was confirmed in the same way whether the test animal could enter the feed station. As with the arrangements for the control sample, measures were taken to mitigate the hunger and dehydration of the test animal. The test sample was installed for 7 to 9 days.

5) The above test was conducted with 3 individuals in 3 cycles, and the entry of the Norway rats into the feed station was investigated with the test sample.

*In the case the animal gnawed through a sample and entered the feed station 3 days' worth of food and water (for Friday, Saturday, Sunday) was placed in the feed station, but in the event entry was not confirmed on a weekday, the same amount of food and water was placed at the nest site.

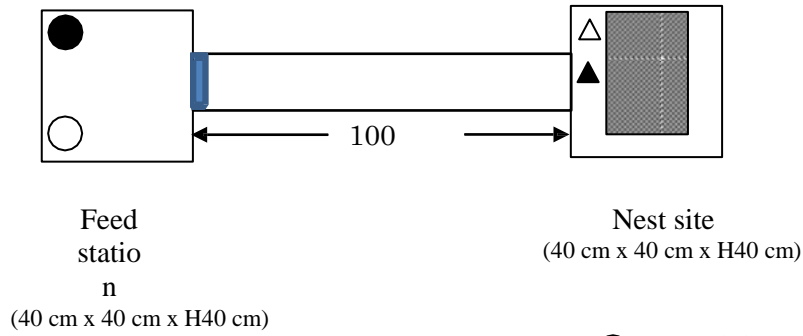


Fig. 1 Test equipment

- :Weekday water
- :Weekday feed (powder feed)
- :Resting place (tank containing sawdust)
- :Control sample and test sample
- ▲ :Holiday feed (powder feed)
- △ :Wednesday and weekend water

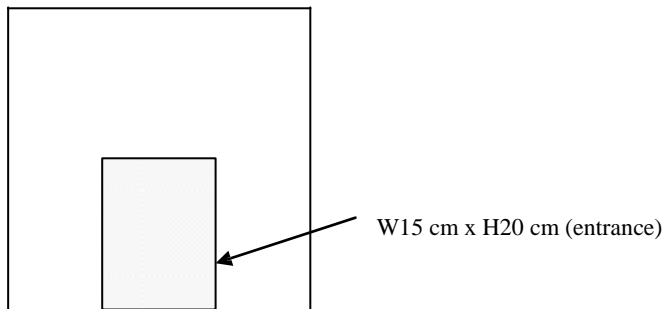


Fig. 2 Apparatus cross-section (from the corridor): No installation

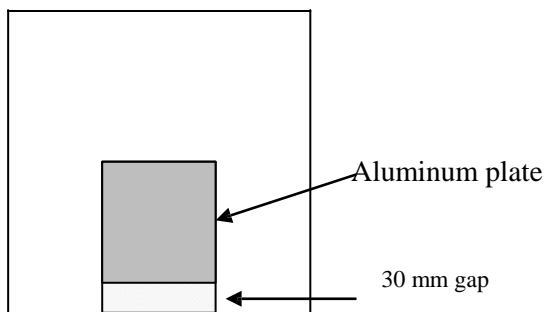


Fig. 3 Apparatus cross-section: Aluminum plate installed

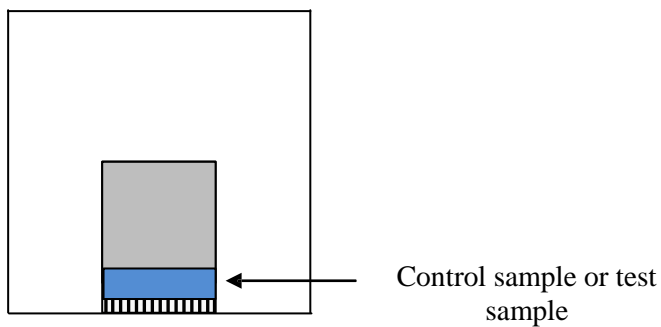


Fig. 4 Apparatus cross-section: Samples installed

6. Test results: The test results are summarized in Photos 1 to 24 and Tables 1 to 3.

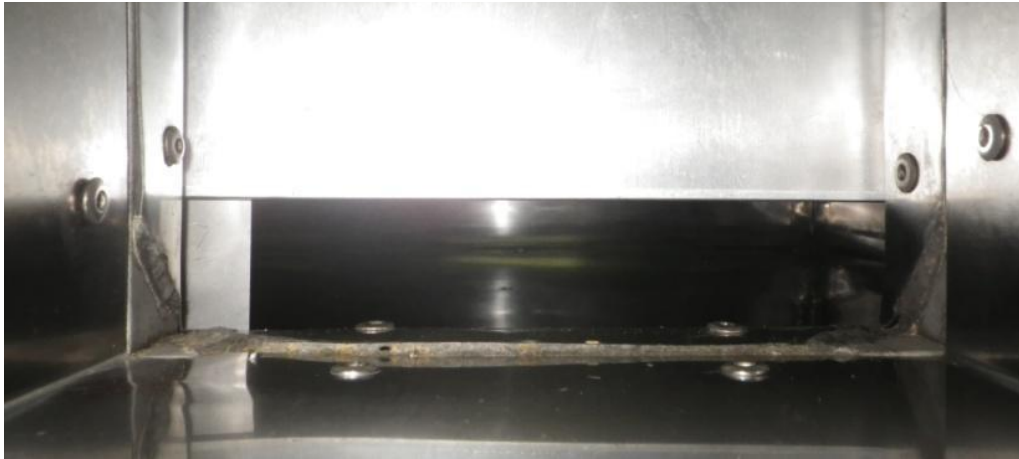
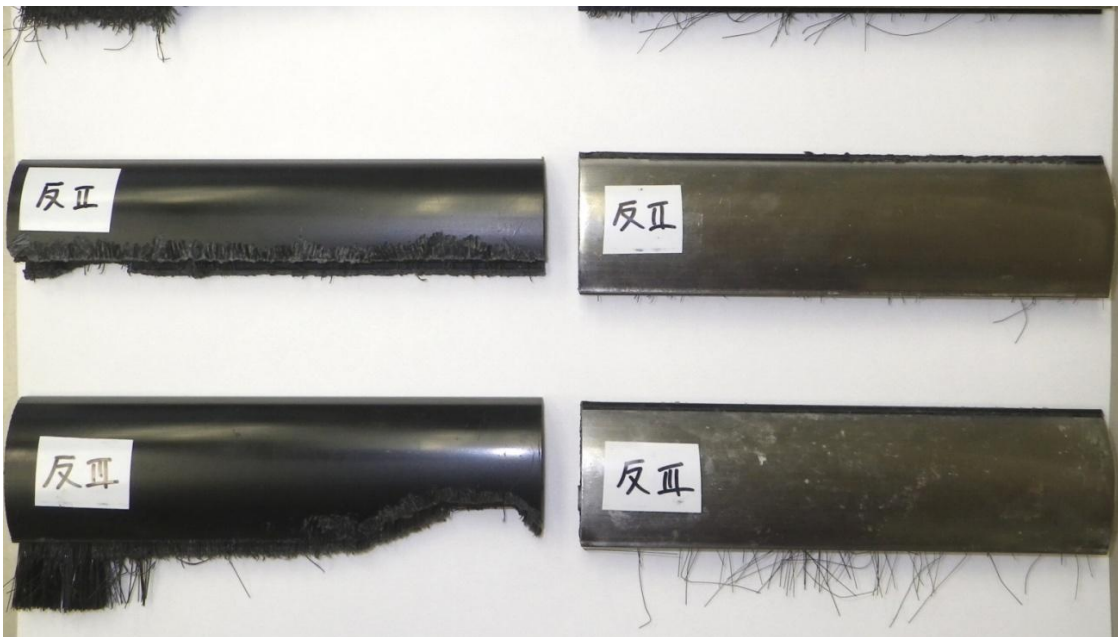


Photo 1 No installation



Photos 3-6: Control sample installation for Cycle I

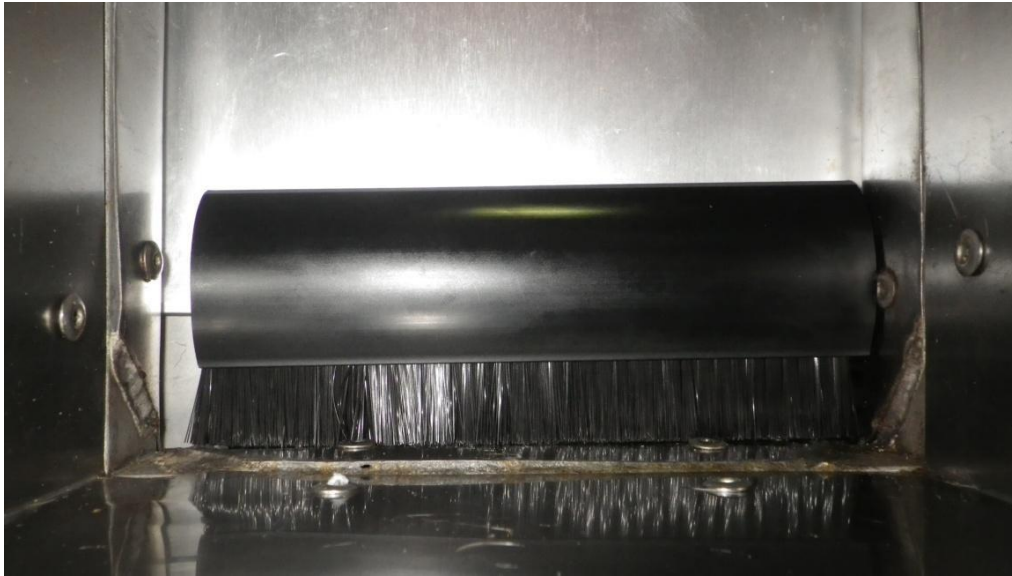


Photo 3 Initial condition of control sample installation (Cycle I)



Photo 4 Condition of control sample installation after 1 day (Cycle I)



Photo 5 Condition of control sample installation after 3 day (Cycle I)

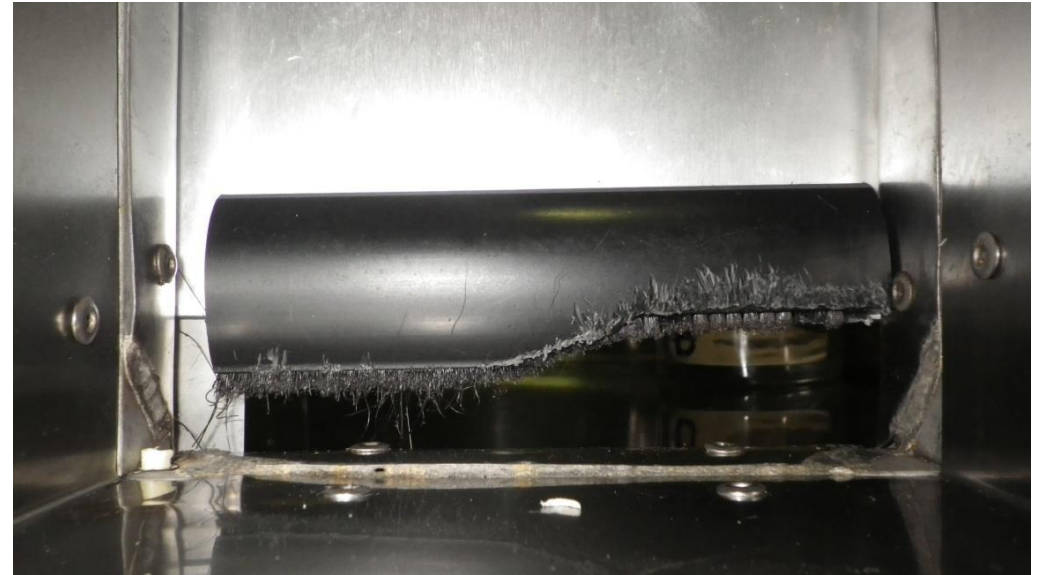


Photo 6 Condition of control sample installation after 4 days (Cycle I) - Entry into feed station

Photos 7-10: Test sample installation for Cycle I

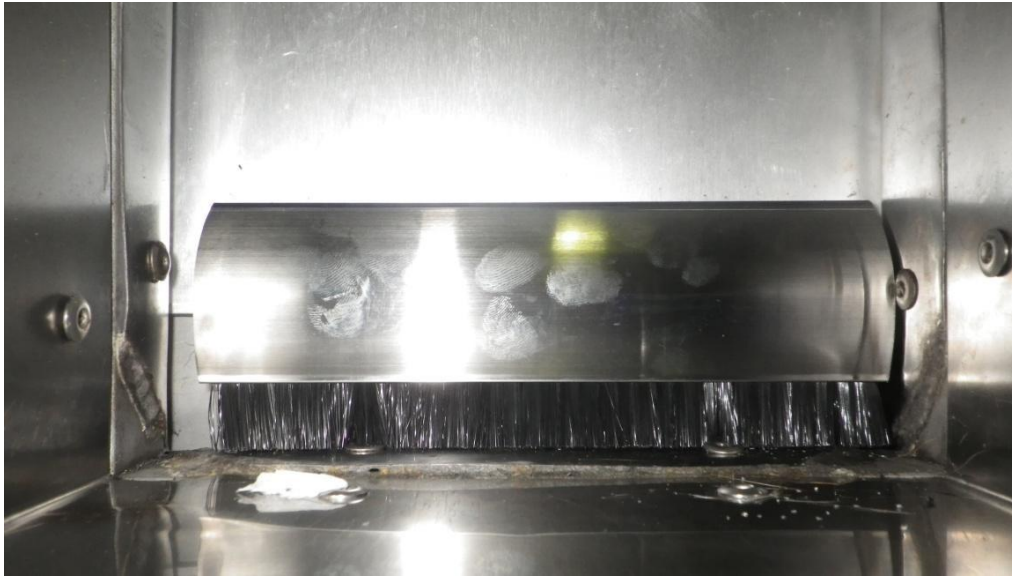


Photo 7 Initial condition of test sample installation (Cycle I)

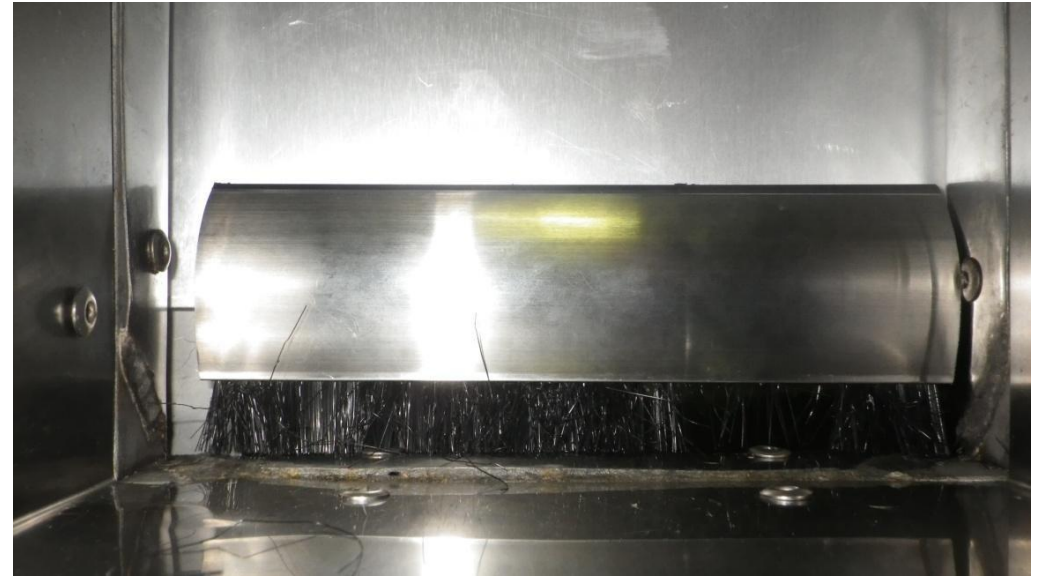


Photo 8 Condition of test sample installation after 1 day (Cycle I)

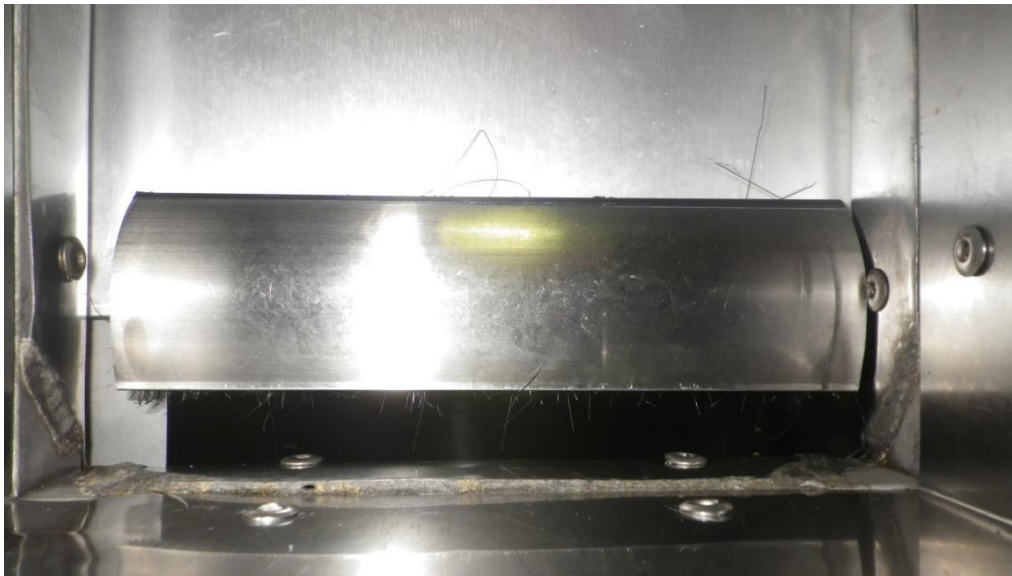


Photo 9 Condition of test sample installation after 2 days (Cycle I)

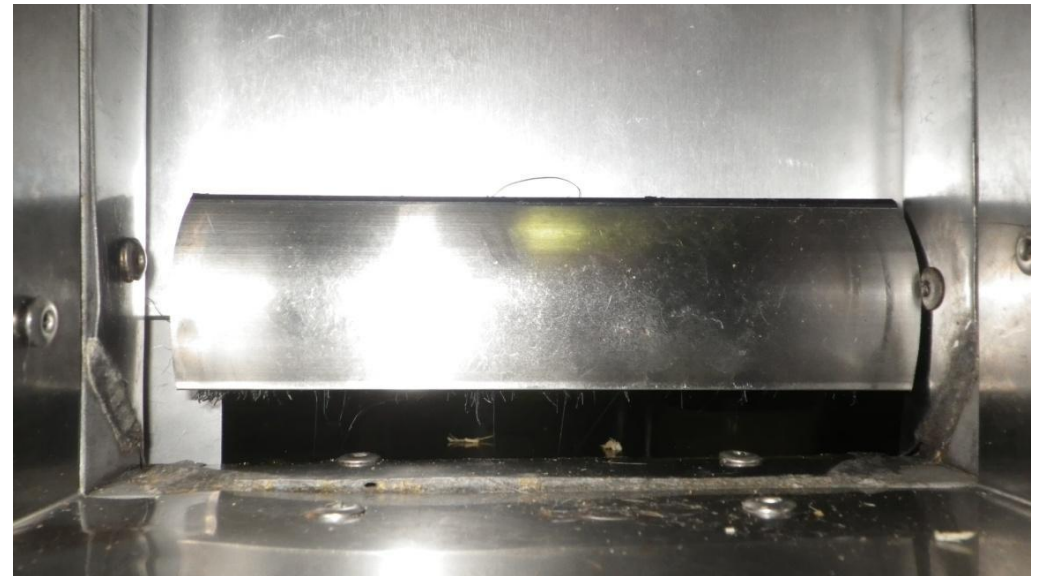


Photo 10 Condition of test sample installation after 7 days (Cycle I)

Photos 11-14: Control sample installation for Cycle II

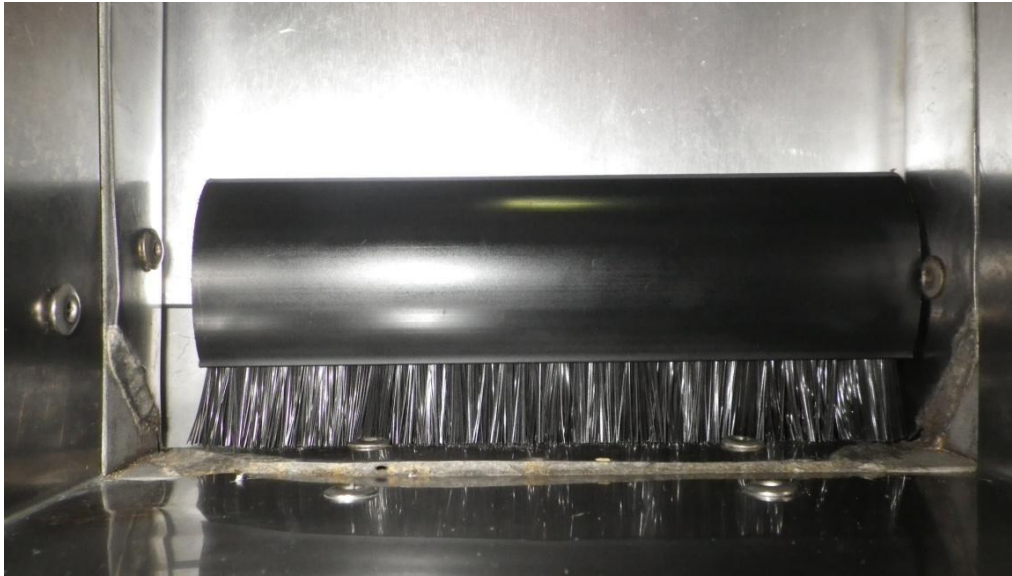


Photo 11 Initial condition of control sample installation (Cycle II)

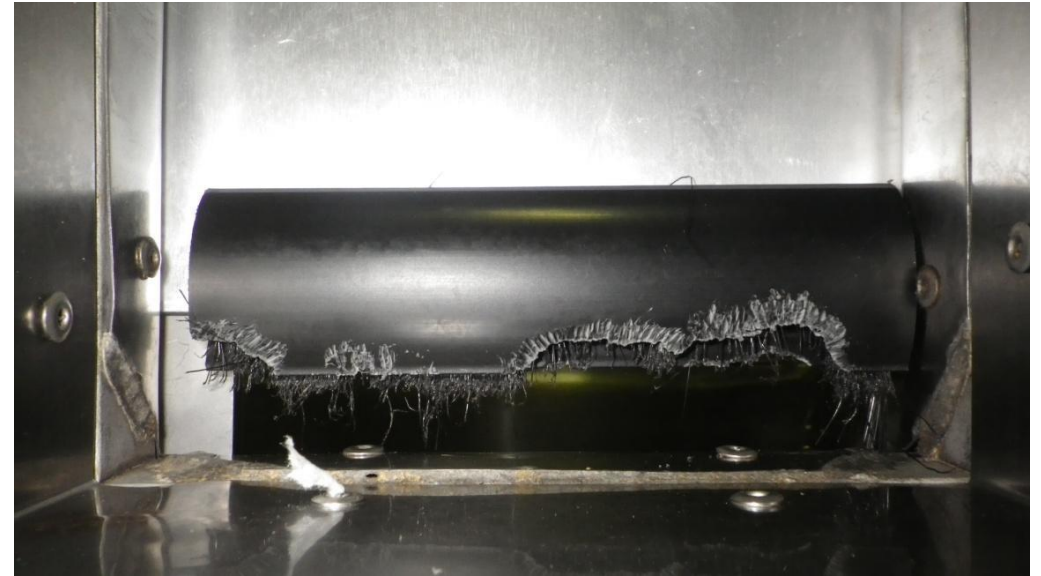


Photo 12 Condition of control sample installation after 1 day (Cycle II)

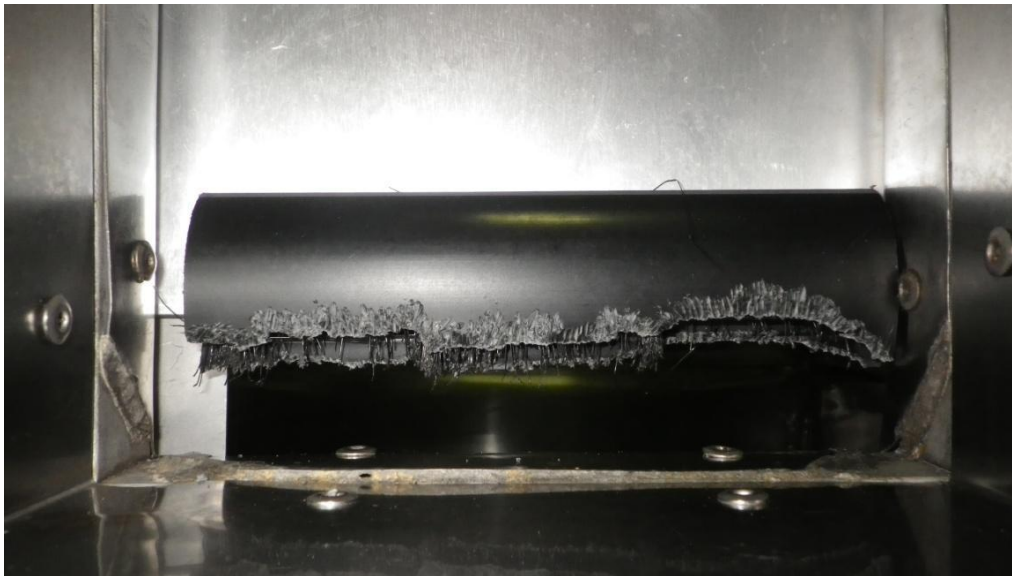


Photo 13 Condition of control sample installation after 2 days (Cycle II)

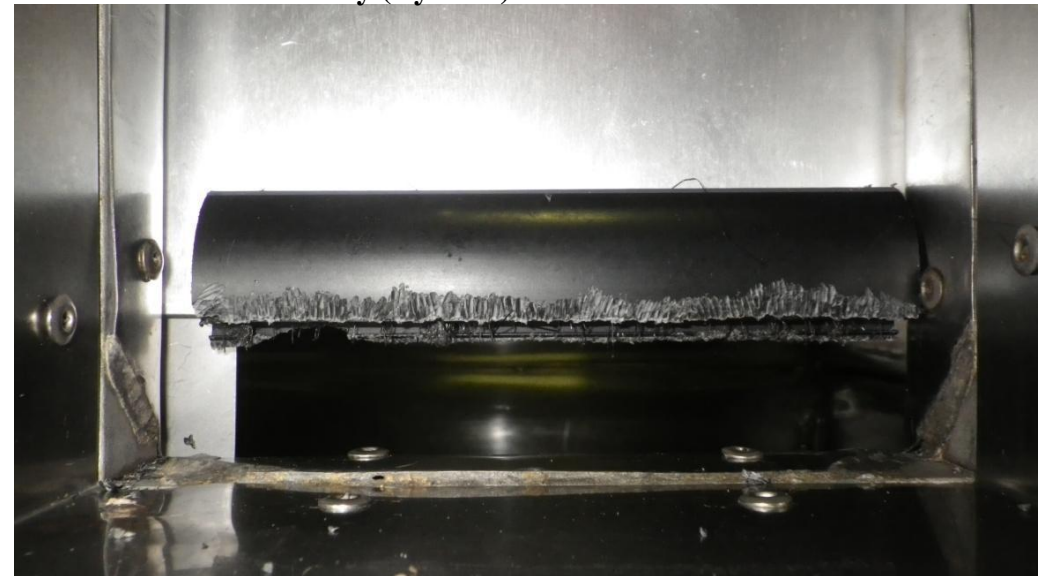


Photo 14 Condition of control sample installation after 5 days (Cycle II) - Entry into feed station

Photos 15-17: Test sample installation for Cycle II

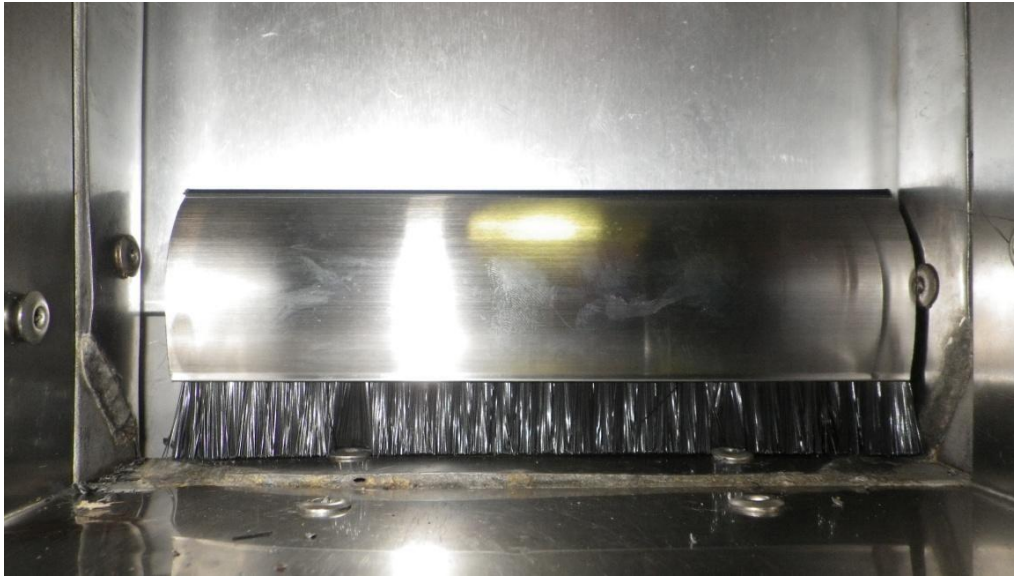


Photo 15 Initial condition of test sample installation (Cycle II)

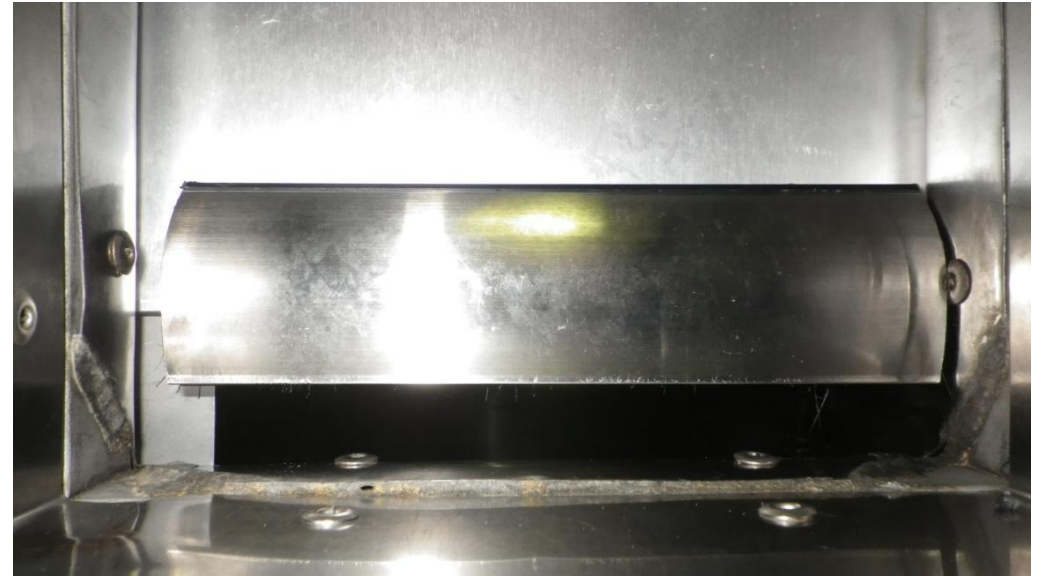


Photo 16 Condition of test sample installation after 2 days (Cycle II)

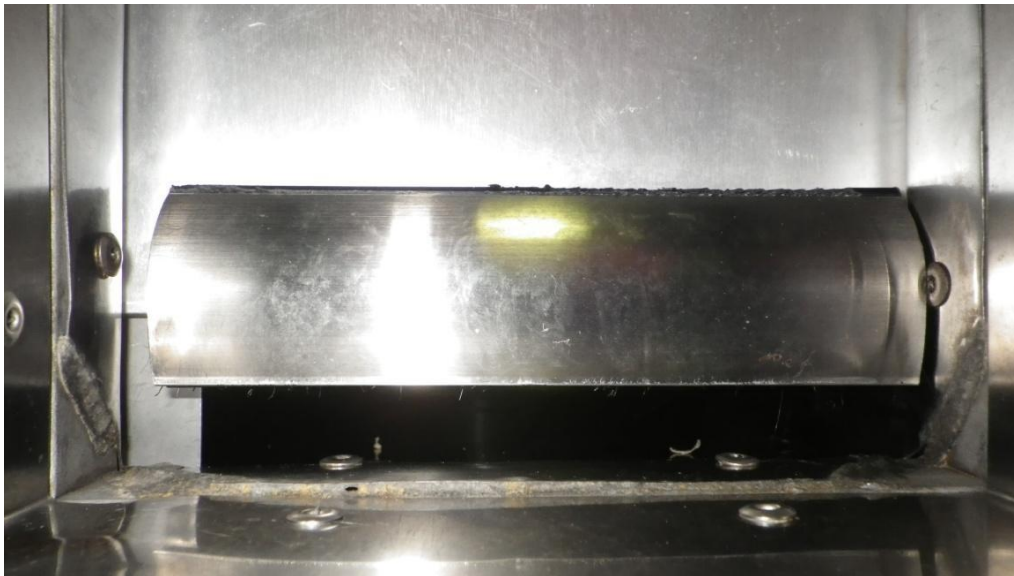


Photo 17 Condition of test sample installation after 8 days (Cycle II)

Photos 18-21: Control sample installation for Cycle III

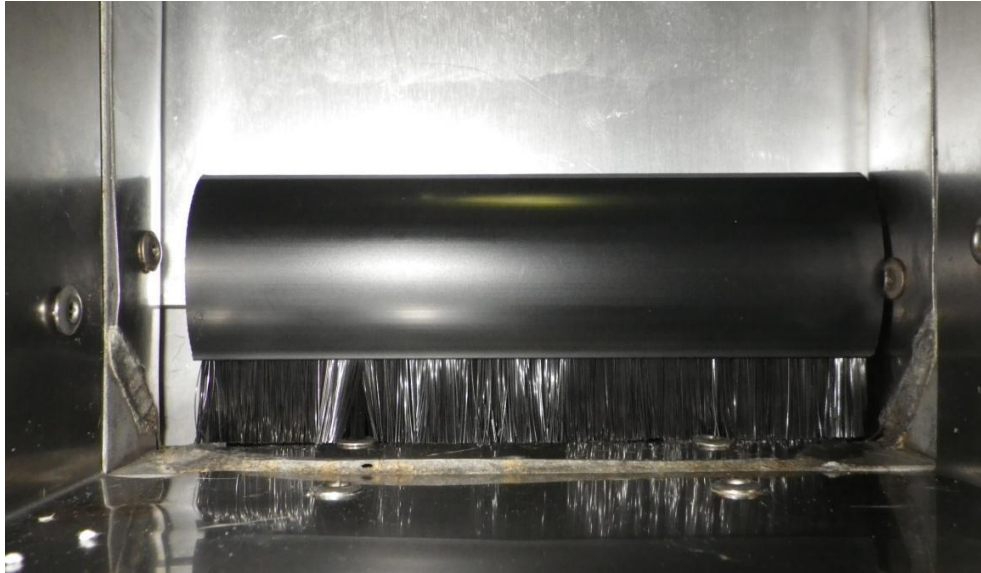


Photo 18 Initial condition of control sample installation (Cycle III)



Photo 19 Condition of control sample installation after 1 day (Cycle III)



Photo 20 Condition of control sample installation after 2 days (Cycle III) - Entry into feed station



Photo 21 Condition of control sample installation after 7 days (Cycle III)

Photos 22-24: Test sample installation for Cycle III

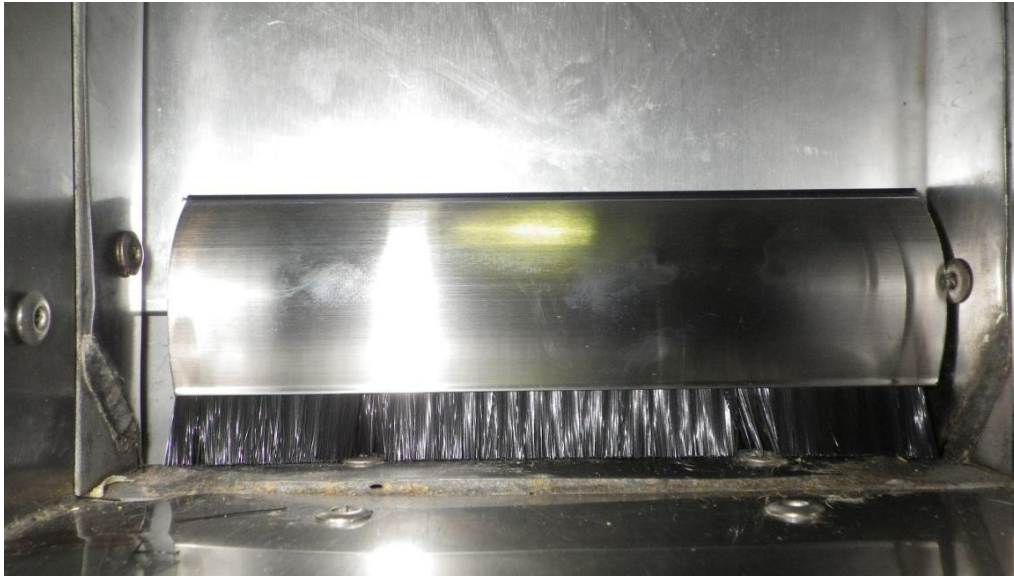


Photo 22 Initial condition of test sample installation (Cycle III)



Photo 23 Condition of test sample installation after 2 days (Cycle III)

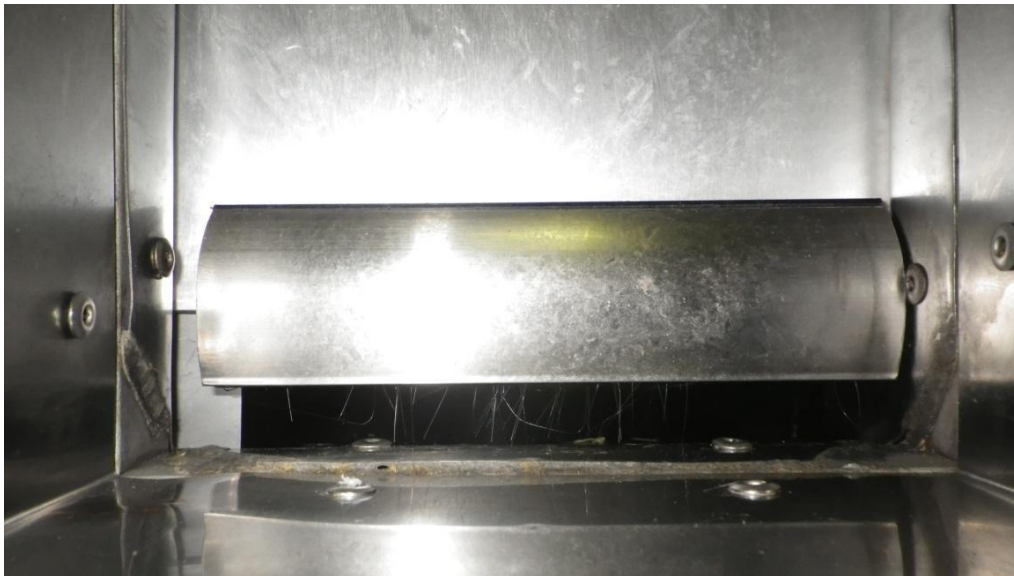


Photo 24 Condition of test sample installation after 7 days (Cycle III)

Table 1 Cumulative consumption (g) during no sample installation

Cycle	Cumulative consumption Consumption (g) per day								
	-7	-6	-5	-4	-3	-2	-1	0 (day)	
I		6.74	18.44	30.44	44.24	-	-	94.04	13.43
II	9.40	-	31.15	-	-	66.11	76.36	84.71	10.59
III			20.75	39.36	60.64	-	-	117.27	19.55

Temperature and humidity:

CycleI; 22.5-25.2°C (average 23.9°C), 49-87% (average 65%)
 CycleII; 22.6-26.7°C (average 23.9°C), 67-87% (average 80%)
 Cycle III; 22.5-25.2°C (average 23.5°C), 34-60% (average 44%)

Table 2 Cumulative consumption (g) during control sample installation

Cycle	Cumulative consumption Consumption (g) per day								
	-7	-6	-5	-4	-3	-2	-1	0 (day)	
I	0	0	0	14.72	-	-	74.72	98.62	12.33
II				0	0	-	-	44.95	8.99
III		0	6.47	21.13	35.76	-	-	74.96	10.71

Temperature and humidity:

CycleI; 23.4-26.2°C (average 24.6°C), 49-82% (average 64%)
 CycleII; 22.9-25.3°C (average 23.9°C), 50-81% (average 67%)
 Cycle III; 22.4-28.0°C (average 24.6°C), 27-65% (average 49%)

Table 3 Cumulative consumption (g) during test sample installation

Cycle	Cumulative consumption Consumption (g) per day								
	-8	-7	-6	-5	-4	-3	-2	-1	0 (day)
I			0	0	0	-	-	-	0
II		0	0	0	0	-	-	-	0
III	0	0	0	0	-	-	0	0	0

Temperature and humidity:

CycleI; 23.3-25.9°C (average 24.4°C), 68-81% (average 76%)
 CycleII; 21.7-26.4°C (average 24.6°C), 36-85% (average 62%)
 Cycle III; 21.4-27.3°C (average 23.4°C), 25-65% (average 39%)

7. Summary (1): Number of days required to enter the feed station

Cycle	No. of days required to enter the feed station	
	Control sample	Test sample
I	4	Could not enter
II	3 or 4	Could not enter
III	2	Could not enter

Summary (2): Consumption per day during the installation of no sample, the control sample, and the test sample

Cycle	Consumption per day (g)		
	No installation	Control sample	Test sample
I	13.43	12.33	0
II	10.59	8.99	0
III	19.55	10.71	0

8. Discussion: The results of a test on the effectiveness of the “Burrat Samurai Armor, bristle length 12 mm (PP, 0.15, black, straight)” in preventing the entry of Norway rats are as follows.

The daily feed consumption of the Norwayrats when no sample was installed was 13.43 g (Cycle I), 10.59 g (Cycle II), and 19.55 g (Cycle III), respectively. Although there were individual differences, they generally exhibited good consumption.

With the resin control specimen, all the individuals gnawed the brush section from the first day after installation, and signs of significant gnawing of the base of the brush were observed. The number of days taken from installation of the control sample until entry into the field station were 4 days, 3 to 4 days, and 2 days, for Cycle I, Cycle II, and Cycle III, respectively. It was suggested that the group of individuals used in this experiment took at least approximately 2 days to enter the field station when the resin sample was used.

In contrast, with the test sample, which is was the same form as the control sample but made from stainless steel, signs of gnawing of the brush section were observed in all cycles on the first day after installation, but the stainless steel section was not gnawed and the rats did not enter the feed station.

As detailed above, the installation of the “Burrat Samurai Armor, bristle length 12 mm (PP, 0.15, black, straight)” on entry points may prevent the entry of Norway rats. Regarding the installation of the test sample, small house mice may be able to pass through bristles of length 12 mm, so it may be necessary to select a bristle length according to the size of the mice in question.

The effective period of the test sample is unknown, but although fine scratches were confirmed in the sample by microscope after the test, they did not affect performance. In future, it would be beneficial to obtain an understanding of the effective period of the test sample using a sample that has undergone accelerated deterioration.

The above data was created based on the results of tests I, Toru KAZUMA, conducted and there are no discrepancies.

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